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TI **Epoxy resin** compositions for **semiconductor sealants**
IN Kondo, Akihiro
PA Sumitomo Bakelite Co., Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 4 pp.
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LA Japanese
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ICS H01L023-31; C08K003-22; C08K005-09; C08L061-10; C08L063-00
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PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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PRAI JP 1991-152945		19910625		

AB The title compns. with good heat and fire resistance contain 0.01-10 parts reducing agents vs. 100 parts mixts. comprising **epoxy resins**, phenol **novolak resin** hardeners, hardening accelerators, Sb2O3, halogenated **epoxy resins**, inorg. fillers, and other additives. Thus fused SiO2 70, **epoxy resin** (200 **epoxy** equiv) 18, phenol **novolak** resin (104 OH value) 9, diazabicycloundecene 0.5, Sb2O3 3, halogenated **epoxy resin** (270 **epoxy** equiv) 2, carnauba wax 2, carbon black 0.3, and oxalic acid 8 parts were melt kneaded, crushed, molded at 175.degree., and post-cured at 175.degree. for 8 h to obtain test pieces showing resistance 0.7 .OMEGA. initially and <1 .OMEGA. after 400 h at 200.degree..

ST **epoxy resin** compn **semiconductor sealant**; heat resistant epoxy potting compn; fireproof **epoxy resin** compn **sealant**; reducing agent **epoxy resin sealant**

IT **Epoxy resins**, uses
RL: USES (Uses)
(blends, with phenol **novolak resins** and halogenated **epoxy resins**, contg. reducing agents, for **sealing semiconductors**)

IT Reducing agents
(**epoxy resin** compns. contg., for **sealing semiconductors**, heat-resistant)

IT Heat-resistant materials
(**epoxy resin** compns., contg. **novolak** phenolic resin curing agents and reducing agents, for **sealing semiconductors**)

IT **Electronic** device packaging
(**epoxy resin** compns., contg. **novolak** phenolic resin curing agents and reducing agents, for **semiconductors**, heat-resistant)

IT **Epoxy resins**, compounds
RL: USES (Uses)
(halogenated, blends, with **epoxy resins** and **novolak** phenolic resins, contg. reducing agents, for **sealing semiconductors**)

IT Phenolic resins, uses

RL: MOA (Modifier or additive use); USES (Uses)
(**novolak**, crosslinking agents, for **epoxy resin** compns., for **sealing semiconductors**)

IT 39350-32-8, Diazabicycloundecene
RL: USES (Uses)
(curing accelerators, **epoxy resin** compns. contg., for **sealing semiconductors**)

IT 1309-64-4, Diantimony trioxide, uses
RL: USES (Uses)
(**epoxy resin** compns. contg., for **sealing semiconductors**)

IT 60676-86-0, Fused silica
RL: USES (Uses)
(fillers, **epoxy resin** compns. contg., for **sealing semiconductors**)

IT **50-81-7**, Ascorbic acid, miscellaneous 144-62-7, Oxalic acid, miscellaneous
RL: MSC (Miscellaneous)
(reducing agents, **epoxy resin** compns. contg., for **sealing semiconductors**)

DERWENT-ACC-NO: 1993-050471

DERWENT-WEEK: 199306

TITLE: Resin compsn. for IC(s) with improved storage life at higher temp. - contg. reducing agent, epoxy! resin, phenol! novolak resin curing agent curing accelerator, antimony oxide, halogenated epoxy! resin, inorganic filler, etc.

PATENT-ASSIGNEE: SUMITOMO BAKELITE CO[SUMB]

PRIORITY-DATA: 1991JP-0152945 (June 25, 1991)

PATENT-FAMILY:

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JP 05003269 A	January 8, 1993	N/A	004	H01L 023/29

APPLICATION-DATA:

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INT-CL (IPC): C08K003/22, C08K005/09 , C08L061/10 , C08L063/00 , H01L023/29 , H01L023/31

ABSTRACTED-PUB-NO: JP 05003269A

BASIC-ABSTRACT:

Compsn. contains 0.1-10 wt. parts reduction agent added to a 100 wt. parts of resin compsn. made of an epoxy resin, a phenol novolak resin curing agent, a curing accelerator, an antimony oxide, a halogenated epoxy

resin, an inorganic
filler and other additives.

ADVANTAGE - Improved fire resistance, mouldability and storage life at higher
temp..

In an example, a compsn. was prepd. by blending (wt. parts): (70) fused silica,
(18) epoxy resin, (9) phenol novolak resin curing agent, (0.5)
di-aza-bicyclo-undecene, (3) antimony trioxide, halogenated epoxy resin, (2)
carnauba wax, (0.3) carbon black and (8) oxalic acid, mulled at 95-100 deg.C.
in a co-kneader, cooled, pulverised and tablettted to sealing resin compsn. for
semiconductor. The compsn. was cured for 2 minutes at 175 deg.C. and post
cured for 8 hours at 175 deg.C.. A test of the moulded compsn. held at 200
deg.C. and inspected every 50 hours showed that resistance was not changed for
400 hours compared with the initial 0.7 ohm

CHOSEN-DRAWING: Dwg.0/0

TITLE-TERMS: RESIN COMPOSITION IC IMPROVE STORAGE LIFE HIGH TEMPERATURE CONTAIN
REDUCE AGENT POLYEPOXIDE RESIN POLYPHENOL NOVOLAK RESIN CURE AGENT
CURE ACCELERATE ANTIMONY OXIDE HALOGENATED POLYEPOXIDE RESIN
INORGANIC FILL

ADDL-INDEXING-TERMS:
INTEGRATED CIRCUIT

DERWENT-CLASS: A21 A85 L03 U11

CPI-CODES: A05-A01E2; A05-C01B; A08-D; A08-D01; A08-F02; A08-F04A; A08-R01;
A09-A01; A12-E07C; L04-C20A;

EPI-CODES: U11-A07;

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PATENT ABSTRACTS OF JAPAN

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C08K 3/22
C08K 5/09
C08L 61/10
C08L 63/00

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(22)Date of filing : **25.06.1991**

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(72)Inventor : **KONDO AKIHIRO**

(54) RESIN COMPOSITE

(57)Abstract:
PURPOSE: To obtain a semiconductor sealing composite excellent for storage at high-temperature by consisting mainly of an epoxy resin, a phenol novolac resin curing agent, a curing promoter, antimony oxide, a halide epoxy resin, fused silica, and oxalic acid or arcorbic acid.
CONSTITUTION: A semiconductor sealing resin composite consists mainly of an epoxy resin, a phenol novolac resin curing agent, a curing promoter, antimony oxide, a halide epoxy resin, and an inorganic filler. For example, fused silica 70 parts epoxy resin (epoxy equivalent 200) 18 parts, phenol novolac resin curing agent (hydroxyl equivalent 104) 9 parts, DBU 0.5 parts, antimony trioxide 3 parts, halide epoxy resin (epoxy equivalent 270) 3 parts, carnauba wax 2 parts, carbon black 0.3 parts, and oxalic acid 8 parts as the reducing agent are mixed sufficiently at a normal temperature. Further, the mixture is kneaded by a cokneader at 95-100°C. It is crushed after cooling into tablets as molding materials.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the resin constituent for the semi-conductor closures excellent in the elevated-temperature storage property and burning resistance suitable for the closures of high integration IC.
[0002]
[Description of the Prior Art] Although the closure of the electronic parts, such as an integrated circuit, is conventionally carried out with thermosetting resin, the operating environment reaches far and wide from an elevated temperature and the dryness to [from the low temperature] the humid condition. The above-mentioned electronic parts used for an automobile etc. in it are exposed to the severest conditions, and the fall of the dependability under highly humid poses especially a problem recently. That is, a large number [the example of an actual proof that the reed wire which connects this chip and lead is disconnected] although above-mentioned electronic parts consist of a chip, a lead, etc.
[0003] What is depended on AL line on a chip and the corrosion for a bonding area of a reed wire (Au line) other than deformation of the reed wire by impregnation of the resin at the time of shaping as a cause of an open circuit can be considered. As a report of exfoliation of Au and AL interface, there is BELL ** (L. G.Feinstein) (1980) etc. partly, there are many views of what is depended on the impurity contained in a resin constituent, especially halogen ion, and when exposed to an elevated temperature, it has appeared notably.
[0004] Generally the halogenation epoxy resin contributed to the burning-resistance property called a flame retarder to the resin constituent for the semi-conductor closures as a thing containing a halogen is added. Usually, it is used combining a halogenation epoxy resin and antimony oxide in many cases as a flame retarder. Although it had corresponded by increasing the addition of a flame retarder to heat-resistant improvement, it was only difficult for the inconvenient phenomenon of reducing not only the problem of industrial regulation but an elevated-temperature storage property to produce the increment in an addition, and to obtain the resin constituent with which both properties are compatible.

[0005]
[Problem(s) to be Solved by the Invention] In order that this invention may solve troubles, such as an open circuit by the corrosion of the wire-bonding section under the conventional high temperature service, it was made as a result of various examination, and the place made into the purpose offers the resin constituent for the semi-conductor closures excellent in the elevated-temperature storage property, without degrading burning resistance and a moldability.
[0006]
[Means for Solving the Problem] That is, this invention is a resin constituent for the semi-conductor closures characterized by adding the reducing agent of 0.01 - 10 weight section to the resin constituent 100 weight section which consists of an epoxy resin, a phenol novolak resin curing agent, a hardening accelerator, antimony oxide, a halogenation epoxy resin, an inorganic filler, and other additives.
[0007] As for the epoxy resin used for this invention, bisphenol mold epoxy, phenol novolak mold epoxy, heterocycle mold epoxy, these denaturation objects, etc. are mentioned, and these may be independent or may be used together. A halogenation epoxy resin has bisphenol mold epoxy, novolak mold epoxy, etc. A phenol novolak resin curing agent has a phenol novolak, cresol novolaks, these denaturation objects, etc.
[0008] To one hydroxyl group of a curing agent, the compounding ratio of an epoxy resin and a phenol novolak resin curing agent needs to adjust combination so that it may become within the limits of 0.5-2 about the number of epoxy groups of an epoxy resin. If less than 0.5 and 2 are exceeded, moisture resistance, shaping workability, and the electrical property of a hardened material will worsen. Preferably, the combination which the number of epoxy groups of an epoxy resin makes within the limits of 1.1-1.3 to one hydroxyl group of a curing agent is suitable. Absorptivity goes up, the thermal shock at the time of solder immersion increases, and the thing exceeding less than 1.1 and 1.3 has the inclination for solder-proof stress nature to worsen.
[0009] a hardening accelerator can use widely what is generally used for the charge of closure material that what is necessary is just what promotes the reaction of an epoxy group and a phenolic hydroxyl group, for example, has diazabicycloundecen (DBU), triphenyl phosphine, dimethyl benzylamine, 2-methylimidazole, etc., and is independent -- or it is used together and used. Fused silica powder, spherical silica powder, and crystal silica powder, secondary condensation silica powder, porosity silica powder, etc. are mentioned to an inorganic filler, and especially fused silica powder is desirable.
[0010] Although the resin constituent for the semi-conductor closures of this invention uses an epoxy resin, a phenol novolak resin curing agent, a hardening accelerator, antimony oxide, a halogenation epoxy resin, and an inorganic filler as a principal component, other than this, various additives, such as low stress additives, such as release agents, such as coloring agents, such as a silane coupling agent, carbon black, and red ocher, a natural wax, and a synthetic wax, and silicone oil, and rubber, are blended suitably, and it does not interfere.
[0011] Although the hydride, a metal salt, an organic acid, etc. are generally mentioned as a reducing agent, the most of the hydride is a liquid, the addition approach is difficult, and

since dependability falls, a metal salt is not desirable. Although an organic acid acts on an oxidizer and a reducing agent by the case, as a reducing agent used for this invention, an organic acid with very low oxidation capacity is desirable. For example, there are a formic acid, oxalic acid, arcorbic-acid etc., and oxalic acid especially with few carbon numbers is desirable. The halogenation epoxy resin used as a flame retarder and antimony oxide can demonstrate the synergistic effect of flameproofing greatly with the combination. However, the halogenation epoxy resin has the problem which is said that a halogen tends to separate at the time of an elevated temperature faced with the cause of corrosion.

[0012] However, this problem can be solved in combination with a reducing agent. The addition of a reducing agent has the desirable range of 0.01 - 10 weight section to the resin constituent 100 weight section which consists of an epoxy resin, a phenol novolak resin curing agent, a hardening accelerator, antimony oxide, a halogenation epoxy resin, an inorganic filler, and other additives. If it is under the 0.01 weight section, the engine performance cannot fully be demonstrated. If 10 weight sections are exceeded, the hardenability at the time of closure shaping will get worse. As the addition approach of a reducing agent, after carrying out heating fusion of a halogenation epoxy resin and the little phenol novolak resin curing agent beforehand, add a reducing agent, it is made to cool quickly, this cooling object is ground, and the method of mixing with a residual component is also.

[0013]

[Example] Hereafter, an example explains this invention concretely. The section of the blending ratio of coal expresses the weight section.

The example 1 fused-silica 70 section, the epoxy resin (weight per epoxy equivalent 200) 18 section, The phenol novolak resin curing agent (hydroxyl equivalent 104) 9 section, DBU The oxalic acid 8 section was fully mixed in ordinary temperature as the 0.5 sections, the antimony-trioxide 3 section, a halogenation epoxy resin (weight per epoxy equivalent 270), the carnauba wax 2 section, the carbon black 0.3 section, and a reducing agent, and it kneaded by the ko kneader at further 95-100 degrees C, and ground after cooling, and as a molding material, this was tablet-ized and the resin constituent for the semi-conductor closures was obtained. Shaping hardening of the obtained ingredient was carried out on the die temperature of 175 degrees C, and the conditions for setting-time 2 minutes, and postcure of the obtained mold goods was carried out in 175 degrees C and 8 hours. These mold goods were left in the 200-degree C thermostat, and were taken out every 50 hours, and resistance between the lead pins of mold goods was investigated. An evaluation result is shown in Table 1.

[0014] Example 2 reducing agent was made into arcorbic-acid, and also it was presupposed that it is the same as that of an example 1. An evaluation result is shown in Table 1.

[0015] By the blending ratio of coal shown in one to example of comparison 3 table 1, the resin constituent for the semi-conductor closures was obtained by the same approach as an example 1. The evaluation result is shown in Table 1.

[0016] Rate of change of the resistance at the time of applying an electrical potential difference between each lead of evaluation approach * elevated-temperature resistance

rate-of-change mold goods (chip size 36mm2, 2.0mm of package thickness, wire-bonding **). Less than 1-ohm time amount is made into O to the initial resistance of 0.7 ohms.

[0017]

[Table 1]

表 1

		実施例		比較例		
		1	2	1	2	3
エポキシ樹脂		18				
フェノールノボラック樹脂		9				
DBU		0.5				
三酸化アンチモン		3				
ハロゲン化エポキシ樹脂		2				
溶融シリカ		70				
カルナバワックス		2				
カーボンブラック		1.3				
還元剤	シュウ酸	8	——	——	0.005	15
	アルコルビン酸	——	8	——	——	——
硬化性		○	○	○	○	成形不可
高温抵抗変動率	50時間(200℃)	○	○	○	○	
	100	○	○	○	○	
	150	○	○	○	○	
	200	○	○	○	○	
	250	○	○			
	300	○	○			
	350	○	○			
	400	○	○			
	450					

[0018]

[Effect of the Invention] According to this invention, it is the resin constituent excellent in the elevated-temperature storage property which maintained balance extremely the resin constituent for the semi-conductor closures excellent in burning resistance and a moldability is not only obtained, but, and is industrial very reliable.

[Translation done.]

* NOTICES *

CLAIMS

[Claim(s)]
[Claim 1] The resin constituent for the semi-conductor closures characterized by adding the reducing agent of 0.01 - 10 weight section to the resin constituent 100 weight section which consists of an epoxy resin, a phenol novolak resin curing agent, a hardening accelerator, antimony oxide, a halogenation epoxy resin, an inorganic filler, and other additives.

[Translation done.]

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(54)【発明の名称】　樹脂組成物

(57)【要約】

【構成】　エポキシ樹脂、フェノールノボラック樹脂硬化剤、硬化促進剤、三酸化アンチモン、ハロゲン化エポキシ樹脂、溶融シリカおよびシュウ酸またはアルコルビン酸を主成分とする半導体封止用樹脂組成物。

【効果】　本樹脂組成物で封止された電子部品は、高温保管特性に優れており、高温条件下でチップとリードをつなぐリードワイヤーが断線する問題がない。更に本樹脂組成物は耐燃性および成形性にも優れておりバランスの優れた材料である。

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【特許請求の範囲】

【請求項１】　エポキシ樹脂、フェノールノボラック樹脂硬化剤、硬化促進剤、酸化アンチモン、ハロゲン化エポキシ樹脂、無機充填材およびその他の添加物からなる樹脂組成物１００重量部に対し０．０１～１０重量部の還元剤を添加することを特徴とする半導体封止用樹脂組成物。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】本発明は高集積度ＩＣの封止用に適する高温保管特性および耐燃性に優れた半導体封止用樹脂組成物に関するものである。

【０００２】

【従来の技術】従来より集積回路等の電子部品は熱硬化性樹脂で封止されているが、使用環境は低温から高温、乾燥状態から多湿状態までの広範囲にわたっている。その中で自動車等に使用される上述の電子部品は最も苛酷な条件にさらされており、最近高湿下における信頼性の低下が、特に問題となっている。即ち、上述の電子部品はチップとリード等よりなるが、このチップとリードをつなぐリードワイヤが断線するとの実証例も多数ある。

【０００３】断線の原因として、成形時の樹脂の注入によるリードワイヤの変形の他に、チップ上のＡＬ線とリードワイヤ（Ａｕ線）のボンディング部分の腐食によるもの等が考えられる。ＡｕとＡＬ界面の剥離の報文として、ＢＥＬＬ研（Ｌ．Ｇ．Ｆｅｉｎｓｔｅｉｎ）（１９８０）等いくつかあり、樹脂組成物中に含まれる不純物、特にハロゲンイオンによるものとの見方が多く、高温にさらされた場合それが顕著に現れている。

【０００４】半導体封止用樹脂組成物にはハロゲンを含むものとして難燃剤と呼ばれる耐燃性特性に寄与するハロゲン化エポキシ樹脂が、一般に添加されている。通常難燃剤としてハロゲン化エポキシ樹脂と酸化アンチモンとを組み合わせて使用することが多い。耐熱性の向上に対しては難燃剤の添加量を増加することで対応してきたが、単に添加量の増加は工業的規制の問題ばかりでなく高温保管特性を低下させる不都合な現象が生じ、両特性が両立可能な樹脂組成物を得ることは困難であった。

【０００５】

【発明が解決しようとする課題】本発明は従来の高温条件下におけるワイヤーボンディング部の腐食による断線等の問題点を解決するため、種々の検討の結果なされたもので、その目的とするところは耐燃性および成形性を劣化させることなく、高温保管特性に優れた半導体封止用樹脂組成物を提供するものである。

【０００６】

【問題を解決するための手段】即ち、本発明はエポキシ樹脂、フェノールノボラック樹脂硬化剤、硬化促進剤、酸化アンチモン、ハロゲン化エポキシ樹脂、無機充填材およびその他の添加物からなる樹脂組成物１００重量部

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に対し０．０１～１０重量部の還元剤を添加することを特徴とする半導体封止用樹脂組成物である。

【０００７】本発明に用いるエポキシ樹脂はビスフェノール型エポキシ、フェノールノボラック型エポキシ、複素環型エポキシおよびこれらの変性物等が挙げられ、これらは単独でも併用してもよい。ハロゲン化エポキシ樹脂はビスフェノール型エポキシ、ノボラック型エポキシ等がある。フェノールノボラック樹脂硬化剤はフェノールノボラック、クレゾールノボラックおよびこれらの変性物等がある。

【０００８】エポキシ樹脂とフェノールノボラック樹脂硬化剤の配合比は、硬化剤の水酸基数１に対し、エポキシ樹脂のエポキシ基数を0.５～２の範囲内になるように配合を調整する必要がある。0.５未満または２を越えると耐湿性、成形作業性および硬化物の電気特性が悪くなる。好ましくは、硬化剤の水酸基数１に対し、エポキシ樹脂のエポキシ基数が1.１～1.３の範囲内とする配合が好適である。1.１未満または1.３を越えたものは、吸水性が上がり半田浸漬時の熱衝撃が増加し、耐半田ストレス性が悪くなる傾向がある。

【０００９】硬化促進剤はエポキシ基とフェノール性水酸基との反応を促進するものであればよく、一般に封止用材料に使用されているものを広く使用することができ、例えばジアザビシクロウンデセン（ＤＢＵ）、トリフェニルホスフィン、ジメチルベンジルアミンや２メチルイミダゾール等があり、単独もしくは併用して用いられる。無機充填材には溶融シリカ粉末、球状シリカ粉末、結晶シリカ粉末、２次凝集シリカ粉末、多孔質シリカ粉末等が挙げられ、特に溶融シリカ粉末が好ましい。

【００１０】本発明の半導体封止用樹脂組成物はエポキシ樹脂、フェノールノボラック樹脂硬化剤、硬化促進剤、酸化アンチモン、ハロゲン化エポキシ樹脂および無機充填材を主成分とするが、これ以外にシランカップリング剤、カーボンブラック、ベンガラ等の着色剤、天然ワックス、合成ワックス等の離型剤およびシリコーンオイル、ゴム等の低応力添加剤等の種々の添加剤を適宜配合して差し支えない。

【００１１】還元剤として一般的に水素化合物、金属塩、有機酸等が挙げられるが、水素化合物はそのほとんどが液体でありその添加方法は難しく、また金属塩は信頼性が低下するので好ましくない。有機酸は場合により酸化剤にも還元剤にも作用するが、本発明に使用する還元剤としては極めて酸化能力の低い有機酸が好ましい。例えば、ギ酸、シュウ酸、アルコルビン酸等があり、特に炭素数の少ないシュウ酸が好ましい。難燃剤として用いるハロゲン化エポキシ樹脂と酸化アンチモンはその組み合わせによって難燃化の相乗効果を大きく発揮させることが可能である。しかしながら、ハロゲン化エポキシ樹脂は高温時においてハロゲンが遊離し易く腐食の原因ともなるという問題を有している。

【００１２】しかし、この問題は還元剤との組み合わせで解決することが可能である。還元剤の添加量はエポキシ樹脂、フェノールノボラック樹脂硬化剤、硬化促進剤、酸化アンチモン、ハロゲン化エポキシ樹脂、無機充填材およびその他の添加物からなる樹脂組成物１００重量部に対して０.０１～１０重量部の範囲が好ましい。０.０１重量部未満だと十分にその性能を発揮できない。１０重量部を越えると封止成形時の硬化性が悪化する。還元剤の添加方法としては、あらかじめハロゲン化エポキシ樹脂と少量のフェノールノボラック樹脂硬化剤とを加熱溶融した後に、還元剤を添加し急速に冷却させ、この冷却物を粉砕し、残余の成分と混合するという方法もある。

【００１３】

【実施例】以下、本発明を実施例で具体的に説明する。配合割合の部は重量部を表わす。

実施例１

溶融シリカ７０部、エポキシ樹脂（エポキシ当量２００）１８部、フェノールノボラック樹脂硬化剤（水酸基当量１０４）９部、ＤＢＵ　０.５部、三酸化アンチモン３部、ハロゲン化エポキシ樹脂（エポキシ当量２７０）、カルナバワックス２部、カーボンブラック０.３部、還元剤としてシュウ酸８部を常温で十分に混合し、

更に９５～１００℃でコニーダにより混練し、冷却後粉砕して成形材料として、これをタブレット化して半導体封止用樹脂組成物を得た。得られた材料を金型温度１７５℃、硬化時間２分の条件で成形硬化させ、得られた成形品を１７５℃、８時間で後硬化した。この成形品を２００℃の高温槽に放置し、５０時間毎に取り出し、成形品のリードピン間の抵抗を調べた。評価結果を表１に示す。

【００１４】実施例２

還元剤をアルコルビン酸にした他は実施例１と同一とした。評価結果を表１に示す。

【００１５】比較例１～３

表１に示す配合割合で、実施例１と同様の方法で半導体封止用樹脂組成物を得た。その評価結果を表１に示す。

【００１６】評価方法

＊高温抵抗変動率

成形品（チップサイズ３６mm^2、パッケージ厚２.０mm、ワイヤーボンディング有）の各リード間に電圧をかけた場合の抵抗値の変動率。初期抵抗値0.７Ωに対し、１Ω未満の時間を○とする。

【００１７】

【表１】

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表 1

		実施例		比較例		
		1	2	1	2	3
エポキシ樹脂 フェノールノボラック樹脂 DBU 三酸化アンチモン ハロゲン化エポキシ樹脂 溶融シリカ カルナバワックス カーボンブラック		18 9 0.5 3 2 70 2 1.3				
還元剤	シュウ酸	8	——	——	0.005	15
	アルコルビン酸	——	8	——	——	——
硬化性		○	○	○	○	成形不可
高温抵抗変動率	50時間(200℃)	○	○	○	○	
	100	○	○	○	○	
	150	○	○	○	○	
	200	○	○	○	○	
	250	○	○			
	300	○	○			
	350	○	○			
	400	○	○			
	450					

【0018】

【発明の効果】本発明によると、耐燃性および成形性に優れた半導体封止用樹脂組成物が得られるばかりでな＊く、高温保管特性に優れた極めてバランスのとれた樹脂組成物であり、工業的にも非常に信頼性の高いものである。

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